

US4992943:Apparatus for detecting and storing motor vehicle impact data

Inventor(s): McCracken; Jack J. , Lima, OH 45805

Applicant(s): none

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Abstract:

An invention which facilitates motor vehicle accident reconstruction by providing apparatus for detecting and storing data describing the status of a motor vehicle when it is involved in a collision. The invention includes a plurality of impact detectors, a microprocessor which obtains vehicle status data from the computer systems used in modern motor vehicles, and a memory, such as an EPROM, for storing the data for later retrieval.

Attorney, Agent, or Firm: Beckerman-Rodau; Andrew;

Primary/Assistant Examiners: Gruber; Felix D.;

I claim:

1. Apparatus for detecting and storing motor vehicle status data responsive to an impact, comprising:

- (a) a plurality of impact detection means, located adjacent exterior surfaces of said motor vehicle, for sensing motor vehicle impacts exceeding a predetermined impact threshold level;
- (b) a source of motor vehicle status data;
- (c) polling means, connected to said source of motor vehicle status data and responsive to activation of at least one of said impact detection means, for determining substantially instantaneous data values representative of

said motor vehicle status;
(d) data storage means for continuous storage of said instantaneous data values; and
(e) data output means for retrieval of said instantaneous data values stored by said data storage means.

BACKGROUND OF THE INVENTION

This invention relates to apparatus which detects vehicle impacts and stores both impact data and data representative of the status of the vehicle during impact.

It is desirable to have accurate data describing the status of a motor vehicle upon impact for accident reconstruction. Such accident reconstruction is crucial for determining, among other things, liability arising from an accident. Data with regard to the location of the vehicle impact, the speed of the vehicle, the status of the passenger restraint systems, the status of vehicle lights, and the status of the directional signals are all crucial facts for determining precisely what occurred during an accident.

In a lawsuit seeking damages for property damage and personal injuries arising from a motor vehicle accident it is imperative to reconstruct the accident because liability ultimately depends upon the fault of the motor vehicle operators. In many states today a court must even determine the percentage of fault of each motor vehicle operator if a multi-car accident is involved because liability may be assessed against each operator in proportion to the percentage of fault for which each operator is responsible.

Accidents typically occur very rapidly and unexpectedly, and therefore the motor vehicle operators involved will often not sufficiently recall exactly what transpired during the accident. Additionally, the observations of any passengers in the motor vehicles and any witnesses to an accident are frequently inaccurate due to the rapid and unexpected nature of most motor vehicle accidents.

SUMMARY OF THE INVENTION

The present invention facilitates accident reconstruction by providing apparatus for detecting and storing data which describes the status of a motor vehicle when the motor vehicle is subjected to an impact. This allows an accurate assessment of the condition of the motor vehicle at the time of impact. For example, it allows an after-the-fact determination of the speed of the vehicle upon impact. Additionally, it can accurately be determined whether the impacted vehicle's headlights or directional signals were on and whether the vehicle's passenger restraint systems were in use.

The present invention is designed to take advantage of the vehicle status data that is available from the on-board computers used in modern motor vehicles. However, the invention can also be used with motor vehicles which do not employ on-board computers. Additionally, the present invention provides apparatus which

only detects and stores data describing the status of a motor vehicle when the vehicle is subjected to an impact rather than continuously monitoring the status of the motor vehicle.

In general, the invention features, in one aspect, apparatus for detecting and storing motor vehicle status data in response to an impact. The apparatus includes a plurality of impact detection devices located adjacent to the exterior surfaces of the motor vehicle. The devices sense motor vehicle impacts which exceed a predetermined impact threshold level. The apparatus also includes a polling device which is responsive to activation of at least one of the impact detection devices. The polling device determines substantially instantaneous data values which are representative of the status of the motor vehicle. The apparatus further includes a data storage device for continuous storage of the instantaneous data values determined by the polling device, and a data output device for retrieval of the instantaneous data values stored by the data storage device.

In preferred embodiments, the instantaneous data values represent the motor vehicle speed, the date and time of impact, and the status of the motor vehicle passenger restraint systems.

In additional preferred embodiments, the instantaneous data values identify the particular impact detection device activated and the status of the motor vehicle lighting. The status of the motor vehicle lighting may further identify the status of the motor vehicle directional signal lights, the status of the motor vehicle headlights, and the status of the motor vehicle taillights.

In still additional preferred embodiments, the predetermined impact threshold level is fifteen miles per hour; the data storage device is a PROM, which may be removable from the apparatus for detecting and storing motor vehicle impact data; the data storage device is an EPROM; the data output device is a serial port; the polling device further includes apparatus for periodically erasing the stored instantaneous data values whenever a predetermined number of motor vehicle impacts exceeding a predetermined impact threshold level are sensed by the impact detection devices; the polling device is a microprocessor; and the microprocessor polls the motor vehicle's on-board computer to determine the motor vehicle status.

In another preferred embodiment, the polling means includes a microprocessor and a plurality of polling lines. Each of the polling lines connects the polling means to an activation switch for the motor vehicle system being monitored. The polling line is capable of transmitting a signal from the polling means to the activation switch. A plurality of signal return lines connects each of the activation switches to the polling means and is capable of receiving the signal transmitted to the activation switch only when the activation switch is in an activated position, so that the instantaneous data values representative of the motor vehicle status are determined from the signals received by the polling means from the activation switches.

In another preferred embodiment, the apparatus for detecting and storing motor vehicle impact data further includes identification apparatus for ascertaining the motor vehicle operator. The identification apparatus further includes a data entry device which enables the motor vehicle to be operated upon entry of a valid

operator identification code, and which enables storage of data identifying the operator in the data storage device.

In another aspect, the invention features, apparatus for detecting and storing motor vehicle status data in response to an impact which includes a plurality of impact detection devices located adjacent to the exterior surfaces of the motor vehicle for sensing motor vehicle impacts that exceed a predetermined impact threshold level. The apparatus also includes a polling device which is responsive to activation of at least one of the impact detection devices. The polling device determines data values that are representative of the motor vehicle status. The data values are determined substantially contemporaneously with the impact detection device sensing an impact exceeding a predetermined threshold level, and at subsequent predetermined intervals following the impact. The apparatus further includes a data storage device for continuous storage of the instantaneous data values determined by the polling device, and a data output device for retrieval of the instantaneous data values stored by the data storage device.

In a preferred embodiment, the apparatus further includes identification apparatus for ascertaining the motor vehicle operator. The identification apparatus includes a data entry device which enables operation of the motor vehicle upon entry of a valid operator identification code, and which enables storage of data identifying the operator in the data storage device.

In other preferred embodiments, the polling means is a microprocessor; the microprocessor polls the motor vehicle's on-board computer to determine the motor vehicle status.

In another preferred embodiment, the polling means includes a microprocessor and a plurality of polling lines. Each of the polling lines connects the polling means to an activation switch for the motor vehicle system being monitored. The polling line is capable of transmitting a signal from the polling means to the activation switch. A plurality of signal return lines connects each of the activation switches to the polling means and is capable of receiving the signal transmitted to the activation switch only when the activation switch is in an activated position, so that the instantaneous data values representative of the motor vehicle status are determined from the signals received by the polling means from the activation switches.

In another aspect, the invention features, apparatus for detecting and storing motor vehicle status data in response to an impact which includes a plurality of impact detection devices located adjacent to exterior surfaces of the motor vehicle for sensing motor vehicle impacts exceeding a predetermined threshold level. The apparatus also includes a microprocessor responsive to the impact detection devices. The microprocessor, upon activation of at least one of the impact detection devices, determines data values. The data values identify the activated impact detection device, the activation time and date, and the motor vehicle status at substantially the time of the activation of the impact detection device. The motor vehicle status represents the vehicle speed, the status of the vehicle passenger restraint systems, the status of the vehicle lights, and the status of the vehicle directional signals. The apparatus further includes an EPROM, connected to the microprocessor, which provides continuous storage of the data values. The

EPROM is responsive to the microprocessor which periodically erases the data values stored in the EPROM whenever a predetermined number of motor vehicle impacts exceeding a predetermined impact threshold level are sensed by the impact detection devices. The apparatus additionally includes a serial output port for retrieval of the stored data values from the EPROM.

In preferred embodiments, the microprocessor polls the motor vehicle's on-board computer to determine the motor vehicle status.

In another preferred embodiment, the polling means includes a microprocessor and a plurality of polling lines. Each of the polling lines connects the polling means to an activation switch for the motor vehicle system being monitored. The polling line is capable of transmitting a signal from the polling means to the activation switch. A plurality of signal return lines connects each of the activation switches to the polling means and is capable of receiving the signal transmitted to the activation switch only when the activation switch is in an activated position, so that the instantaneous data values representative of the motor vehicle status are determined from the signals received by the polling means from the activation switches.

In another preferred embodiment, the apparatus further includes identification apparatus for ascertaining the motor vehicle operator. The identification apparatus includes a data entry device which enables operation of the motor vehicle upon entry of a valid operator identification code, and which enables storage of data identifying the operator in the data storage device.

All the features and advantages of the invention will be apparent from the following detailed description of the preferred embodiments and from the claims.

For a full understanding of the present invention, reference should now be made to the following description and the accompanying drawings.